

Urbanization at the heart of the economy: the role of cities in economic development

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Abstract

The paper discusses the central role of cities and their structures in the social and economic development of regions and nations. Through a brief comparison of Brazil's emergent economy and their huge demands on material infrastructures and the spatial policies of another strong international actor, China, it reasserts the urgency of preparing cities to a renewed role in the global economy.



Shanghai, photo Flavio Coddou

Introduction: urbanization as economic strategy

Whenever and wherever societies have flourished and prospered rather than stagnated and decayed, creative and workable cities have been at the core of the phenomenon; they have pulled their weight and more. It is the same still. Decaying cities, declining economies, and mounting social troubles travel together. The combination is not incidental.

Jane Jacobs, New Foreword to the 1992 edition of *The Death and Life of Great American Cities*

Economic growth is a central concern in our globalized societies, both in contexts of economic crisis affecting solid economies or in developing countries. However, a certain view of the economy as an abstraction, something immaterial, almost as if produced in thin air or under any sort of material condition still dominates the way how we look into our societies. Nothing can be farther from the case. An economy may only emerge in profoundly material and localized conditions – and evolve into a full-fledged economy only in appropriate material conditions. However, what are those conditions?

The aim of this paper is to show the central role of cities as loci of production and places of socioeconomic development. Essentially, it will argue that failing to acknowledge that economic processes are deeply dependent on urban structures may lead to failure in preparing our cities in the necessary speed and scale of economic growth expected especially in fast-developing regions.

In order to do so, the paper emphasizes the central place of cities in the economy through a brief comparison of two countries undergoing processes of development strongly anchored in urbanization. That is of course the case of Brazil and China as emerging economic powerhouses, and new actors in the stability of the world economy. It shall do so in a way to throw light on the relationship between the material basis of a localized economy and economic growth itself. In other words, it consists of a brief analysis of cities as both support and expression of interactions within an economy – interactions rendered possible due to material structures spanning from the inlands of a country to the inner spaces of its cities, and their connections to international networks of production and exchange.

economic activity is geared to a most fundamental aspect of proximity: face-to-face communication, a melting pot of information-rich interactions and unpredictable exchanges which cannot be easily replicated in electronic spaces or technologies of communication across distance

There are fundamental differences between the Chinese and Brazilian contexts, which must be taken into account as the background to any discussion of their modes of organization (including their economic, political and spatial cultures), and the analysis of how systematic has been the preparation of their urban infrastructures¹.

First, China has the role of a key industrial player in the international division of labour. Clearly, a comparison must keep distinct roles in that division. In this sense, the Chinese dependence on urbanization is possibly greater than any other country's. China is the second economy in the world, quickly mutating from a largely rural country into an urban nation (figures 1-4), and doing so taking advantage of the knowledge and experiences of other countries.



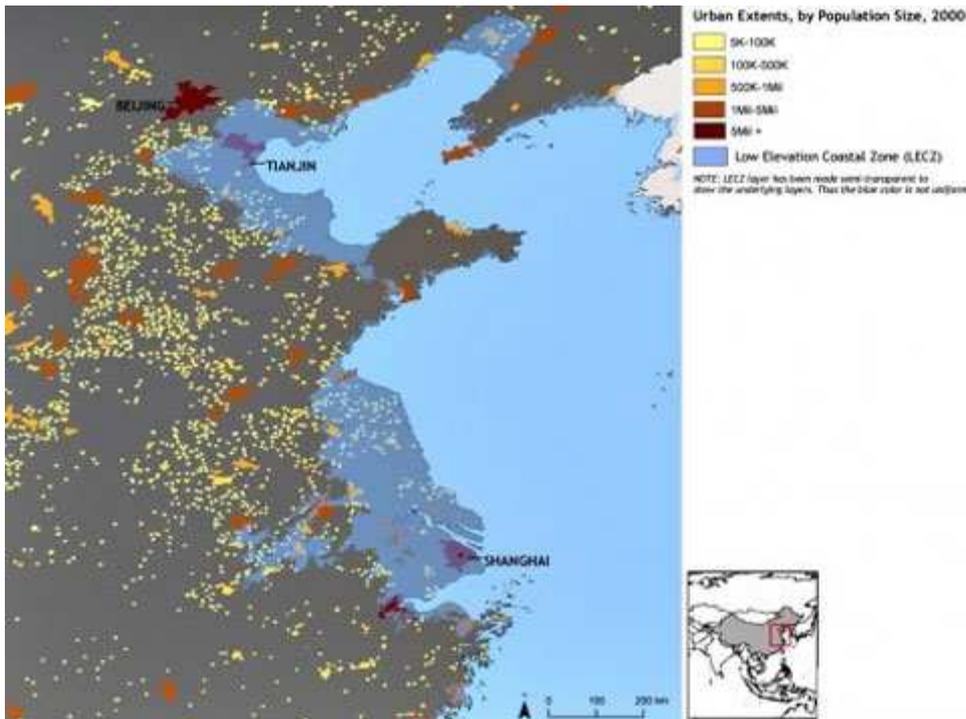
Shenzhen, in southeast China: urban sprawl in 1988 [Nasa Goddard Space Flight Center]



Shenzhen, in southeast China: urban sprawl in 1988 [Nasa Goddard Space Flight Center]



Shenzhen, in southeast China: urban area in 2009, with the peninsula land reclamation and its road network [Google Earth]



This map is a result of studies developed by Columbia University and shows the main urban concentrations in Eastern China [Columbia University]

Also, China urbanizes itself with unparalleled human resources, liquidity of capital rendered available by the government’s central planning, and great investment power. China’s economic growth is strongly anchored in the investment in urbanized infrastructure, including the mobility of production and workers – what has been dubbed “hyper-mobility” (highways and railways: China now has the faster train in the world) and logistic support to manufacture and microeconomic exchange. Urbanization is seen as a structural strategy to reduce China’s dependency on external demand and on exportation.² There are also concerns with the regional distribution of population, conditions for internal consumption, and the growth of medium-sized cities and their comparative advantages, supporting an economic model strongly based on manufacturing activities fostered in the interior of the country through stimuli such as logistics, labour force and tax programmes. The model extends regional networks of infrastructure from the inland into large conurbations.

Finally, there are social advantages for new urbanites migrating from rural economic sectors and locations into the urban economy: China recently prepared for receiving 10 million new urban citizens.³

The fact that China has a giant economy highly based on manufacturing, as a global industrial district does not imply that other countries' economies could afford to ignore the problem of logistics and the material conditions of manufacturing, service and informational industries. As I hope to show below, infrastructure and urbanization are keys to any advanced economic sector. In this sense, Brazil is already a massively urban economy, the eight largest in the world (at the current growth level, heading to become the fifth economy by 2016).⁴ Brazil undergoes a process of transformation at the core of its economy, shifting to a stronger industrial basis and more diversified services and informational sectors, also competing with China and other countries for positions as producer and world-exporter.

distances cannot be measured in rings and absolute distance from place to place – distances are shaped by this network of streets

However, there is an essential difference between China's strategy for development centred on the urbanization of its economy and Brazil's. One may even suggest that the main difference is the fact that China actually has a large-scale, systematic strategy. Brazilian resources delineated for investments in urbanization have been distributed in a great number of individual plans and projects of urban improvement and reorganization, which are required and proposed by local governments. Such projects tend to have great penetration in local contexts. Nevertheless, the very bureaucratic mechanism that asserts such diffusion also implies a lack of connections in terms of what should be a cross-scalar, coordinated programme for preparing cities and regions as a support system for economic growth. If local demands are not met by an overall plan of interventions and fall into a broader scheme, the result is a collection of unconnected dots arranged without actual coordination and control of their potential interaction and role within the larger picture. Planning in Brazil still seems to rely on the idea that any sort of investment in infrastructure would be effective anyway. Outputs are taken for granted. Of course, self-organization is a strong feature in any economy, especially vibrant ones, and the outputs of such localized actions are likely to be positive. However, without a certain level of general coordination of actions and their effects, their overall potentials tend to be undermined from inception.

Keeping these essential differences as a background, one has to acknowledge that an economy is based on a lot of hardware – actual physical structures such as buildings,

roads, and communication technologies. Such structures connect the dots of economic activities and people, allowing their mutual effects to emerge and diffuse across different scales of space.⁵

Nevertheless, what is the role of the city for an economy? Why would certain features of urbanized structures make any difference as sites of the economy? Let us see now the remarkable reasons why economic activity tends to concentrate in the form of cities⁶ (“urbanization as an effect of economic action”). Then let us reverse this approach and see the city as the material form through which a substantial part of the economy comes into being, and discuss more precisely how spatial structures may affect the fluid emergence of economic interaction (or “economic action as an effect of urbanization”).⁷

no discipline has been as skilled and confident in asserting a role for space in society as economics

Urbanization as an effect of economic action

Economics deals with the intensities in relations active within the realm of practice and material reproduction. Despite **Thomas Friedman’s** “flat world”, a reincarnation of previous ideas related to the expansion of trade, internationalization of firms and networked organization across distance at progressively lower costs and a supposed “end of geography” (**O’Brien**), the “death of distance” (**Cairncross**), the emergence of the “space of flows” (**Castells**) or the “weightless economy” (**Quah**), concrete urban spaces still seem to matter.⁸ In fact, no discipline has been as skilled and confident in asserting a role for space in society as economics (through some of its branches, namely economic geography, location theory and urban economics). Studies in spatial economics define the emergence of cities and regional city networks as outputs or externalities of economic processes, with circular effects over the system itself. Distinct and intriguingly complementary features and roles of space in economic activity indeed have been found – most of them leading to the production of spatial agglomerations we call “cities”:

(1) Spatial differences and heterogeneities, an active feature of the distribution of economic activity and formation of economic agglomerations, regional specialization and spatial inequalities. There are two fundamental ontological facts in the materialization of economic action: space is not a frictionless, homogenous surface, and there is no possibility of uniform ubiquity in the spatial distribution of activities.⁹

Heterogeneities generate comparative advantages across space, which in turn give rise to concentration, specialization and trade.¹⁰

However, spatial heterogeneities alone could not be a force strong enough to generate spatial agglomerations in the form of cities. Two other agglomeration forces are at play in the drive to urbanization: one oriented to direct and indirect conditions of production (agglomeration externalities); and a second one mediated by the market itself (pecuniary externalities).

The relation between spatial structure and the plethora of networks of production and exchange lies at the heart of the efficiency of cities as support for the localized economy

(2) Agglomeration externalities in production and consumption: the basic forces for spatial agglomeration and trade arise from non-market interactions that yield increasing returns external to firms. Spill-over effects are localized.¹¹ The effect of interactions in production happens in chains: upstream firms attract downstream firms,¹² interfering in firms and workers' locational patterns. In the case of integration of production and sectors heavily dependent on proximity and face-to-face communication, they also attract final suppliers.

Altogether, these interactions have effects also on location pattern of consumers. **Marshall** was the first to observe three types of agglomeration externalities: increasing returns obtained from sharing inputs in production (input-output linkages); sharing labour markets (labour pooling); and knowledge and technology spill-overs (increases in productivity in upstream sectors leading to increasing levels of localized productivity downstream in an industry). Agglomeration in the final supplier sector in a region emerges as a function of concentration of intermediary suppliers, and vice-versa:¹³ when downstream firms and final suppliers are concentrated, local demand for intermediary products also tends to increase, increasing the attraction of the region for intermediary firms. At the same time, as intermediary products are available in prices diminished due to proximity and reduction of transport costs, firms engaged in final production are also attracted. Thereby, we have a cumulative and circular Myrdian process leading into agglomeration. Upstream and downstream linkages act as centripetal forces leading into the concentration of firms and workers, and into externalities in a local economy.¹⁴ Interestingly, there are two types of scale externalities in urbanized production environments: externalities generated by local

firms within the same industry – localization economies (or in a dynamic context, **Marshall-Arrow Romer** economies);¹⁵ and externalities diffused across sectors and industries, stemming from the diversity in activities latent in growing scales – urbanization economies (or in a dynamic context, **Jacobs** economies).¹⁶

A tradition of empirically-oriented studies has shown that external economies related to the scale of the urban environment extend through three dimensions: industry (the degree to which agglomeration economies extend across industries), space (if agents are physically closer, then there is more potential for interaction; there is an attenuation of agglomeration economies with distance), and time (one agent's interaction with another agent at a point in the past continues to have an effect on productivity in the present).¹⁷

Structured networks and dense urban activity systems generate conditions for fluid movement and interaction especially in large markets.

There is also evidence of returns related to knowledge spill-overs as geographically contained and decreasing with distance.¹⁸ Recent approaches to “buzz cities” and institutional reasons for agglomeration emphasize that, beyond downstream and upstream linkages, labour pooling, and technological spill-overs, economic activity is geared to a most fundamental aspect of proximity: face-to-face communication,¹⁹ a melting pot of information-rich interactions and unpredictable exchanges which cannot be easily replicated in electronic spaces or technologies of communication across distance.

(3) Agglomeration as an effect of market interactions: pecuniary externalities.

Pecuniary externalities have great diversity and potential relation to the urbanization of space. Markets are inherently imperfectly competitive. Fujita and Thisse help us understand that, under imperfect competition, the location of firms can be explained primarily in terms of a search for privileged access to customers and the desire to relax competitive pressures imposed by other firms. Increasing returns lead firms to concentrate production in a few plants, whereas transport costs raise the issue of where to locate those plants.

Spatial competition emerges as a market structure determined both by consumers' preferences for variety and firms' fixed requirements for limited productive resources. “On the demand side, consumers' exhibit a preference for variety, i.e. their utility increases not

only with the total amount of each [...] good, but also with the total number of such goods available. On the supply side, production exhibits internal economies of scale for each good, but no economies of scope across goods [...] The space-economy can be viewed as the outcome of a process involving two types of opposing forces: agglomeration (or centripetal) forces and dispersion (or centrifugal) forces. The resulting spatial distribution of economic activity is a complex balance between these two forces, affecting both consumers and firms”.²⁰

(3.1) The principle of differentiation: firms are likely to locate near their consumers (Hotelling), but firms with homogenous products tend either to locate far (contra Hotelling). Furthermore, there is the possibility of differentiating products in order to avoid a price war, finding positions in the economic division of labour and in the local market, and agglomerating. There is tension between a price competition that pushes firms away from each other, and a competition for market area that tends to pull them together. Nevertheless, such tension fosters differentiation in products and a more diversified localized economy, stimulating consumers' concentration in search of proximity and diversity in facilities and goods.

An urban structure must be robust and resilient enough to allow changing directions in vast numbers of flows of movement and exchange

(3.2) The impact of market size on the location of firms: here, the agglomeration force is generated by each firm's desire for market access. In turn, the dispersion force is generated by each firm's desire to avoid market crowding (like the price war in spatial competition). When one region is larger in terms of population and purchasing power, its comparative advantages attract more firms – in fact, a more than proportional share of firms,²¹ an effect amplified by decreases in transport costs. “This suggests that deeper economic integration within an industry might actually lead to more regional imbalance in the spatial distribution of that industry.”²²

Attraction and integration within industries bring along potentially higher degrees of regional specialization. In addition, size difference gives rise to spatial inequalities among consumers: even though all consumers benefit from deeper industrial integration, those in the larger region tend to achieve the greatest benefits from their direct access to a wider

array of products. “Hence economic integration among regions of different sizes is likely to foster spatial inequalities between them.”²³

Competition for workers and workers’ mobility bring more complexity to such tensions of differentiation. A larger market means increasing demands for goods and services, bringing more firms to the region. Krugman’s home market effect shows that such increases are more than proportional, implying more competition for labour force. Of course, this pushes wages up. In their turn, workers search for positive differences in income. On the other hand, more firms tend to bring more variety in products, and a lower local price index, due to lower transportation costs. Thus, the region would attract even more consumers/workers. Such combination consists of a second kind of cumulative circular effect a la Myrdal, a “snowball” of agglomeration of firms, markets and consumers/workers, the core of regional economies – a process amplified by workers’ mobility.

cities are substantially self-organizing systems resulting from an intriguing relation of things of completely different material nature – the “software” of actions and interactions and the “hardware” of urban structures

There are a number of other concepts that would deepen our understanding of how economic action is deeply immersed in the production of urban spaces, such as path development (an economy develops based on previous, mostly localized dynamics; history matters, and so does its spatial condition). However, we must contend ourselves with these main lines of relation, and reverse them in order to see how the actual form of urbanization – beyond the relation of distance to agglomeration – might impact economic action.

Reversing the view: economic action as an effect of urbanization

Spatial economics has notions like “agglomeration” and “distance” as its central spatial concepts. However, I would like to argue that thinking through such general concepts of economic space may blur certain features of urbanized space, and obscure the full extension of its effects back on economic action. In fact, most economic approaches seem to take the reverse direction in the economy-space relation – from space back to the economy – as unproblematic.

Provided we have agglomeration, the cycle would be complete: the right externalities would be there, feeding production and economic interaction. Notwithstanding, the heterogeneities of space are not contained in differences between regions: they cut across scales into the very structures of the urban – and back. The theoretical problem th hand here is *the role of spatial structures within agglomeration is overlooked*. I shall discuss from now on about the importance of such structures, and *the need to deepen our understanding of urban space in order to deepen our understanding of the role of space to a localized economy*.

Firstly, economic actions operate through *differences in space*, as correctly asserted in spatial economics. A step further, economic actions and interactions operate through different scales, from global and regional landscapes in the form of economically differentiated regions and metropolitan areas, to the inner spatialities of the city – in a continuum of spatial structuration. As we have seen above, economic approaches see this as “spatial heterogeneities”, usually related to “the uneven distribution of immobile resources (natural harbours) and amenities (climate). There are important spatial heterogeneities with respect to the location of transport nodes (transshipment points) and trading places (central business districts).”²⁴ However, such approaches do not realise the full extent of such property: *heterogeneities are also at the very core of urbanized spaces across a landscape, as structural differences in accessibility networks, built form densities and in the varying relational centralities of activity location that take the form of cities. We must advance the concept of “heterogeneity” into the investigation of those structural conditions through which heterogeneities come into being in the first place, and embed economic action*.

We are more cognitively and technologically equipped to reduce uncertainties now, but we still have a lot of work in bringing the theoretical sphere closer to the technical and political spheres of planning

Economic, urbanized spaces embedding the idea of “agglomeration” tend to be seen as absolute distance, with no cumulative production of a rigid materiality to the point of interferences in location processes. This view of the internal geography of cities obscures the role of space and oversimplifies the problem of performance of spatial structures as an expression and support for the localized economy. The usual view of locational

advantages takes into account only the absolute distance between locations, and not the internal distances within the structures of cities. They assume perfect reachability among any positions with same absolute distances, which nevertheless tend to vary according to the form of urban networks – especially in intricate urban structures.

This elastic view of economic space is accompanied by an impression of inherent *transparency* – space seems a kind of platform with full internal visibility and offering knowledge of location opportunities, including those of potential counterparts in production or supply. The structure of space is not seen as a crucial item of economic information²⁵. Hierarchies of street network in cities are a means of generating less or more information about agents – information levels directly related to their level of accessibility. Usual approaches seem to assume economic space as a scenario of perfect information – as if agents had a God's eye view of the network of agents for potential interaction, and their locations.

Of course, that cannot be the case. Let us look closer into the problem of rigidity and structure, location and information within agglomeration we call cities. Cities are, among other things, movement systems – people and artefacts and information – but such flows are not free to take any direction. Cities are structured in spatial systems of built forms arranged in blocks and connected by continuous channels or streets. Inside such rigid and durable spatial system, we can only move within such channels and in the directions they engender. Therefore, distances cannot be measured in rings and absolute distance from place to place – distances are shaped by this network of streets. Furthermore, streets are also heterogeneous – they do not play the same roles in supporting movement, they have fundamental differences in the way they relate to one another. Some of them are more central in their relation and connectivity with other streets in the street network. Some are naturally provided with more accessibility. Varying accessibility levels in turn generate hierarchies of streets.²⁶ Also, the emergence of hierarchies in street networks does not turn them into unproblematic spatial solutions for movement. They have inherent differences in their structures and capacities to generate mobility – which can hardly be improved once consolidated historically.

Optimizing proximity and mobility tends to have the humanization of conditions of live, stimulating the capacities and creativities of people, as positive externalities.

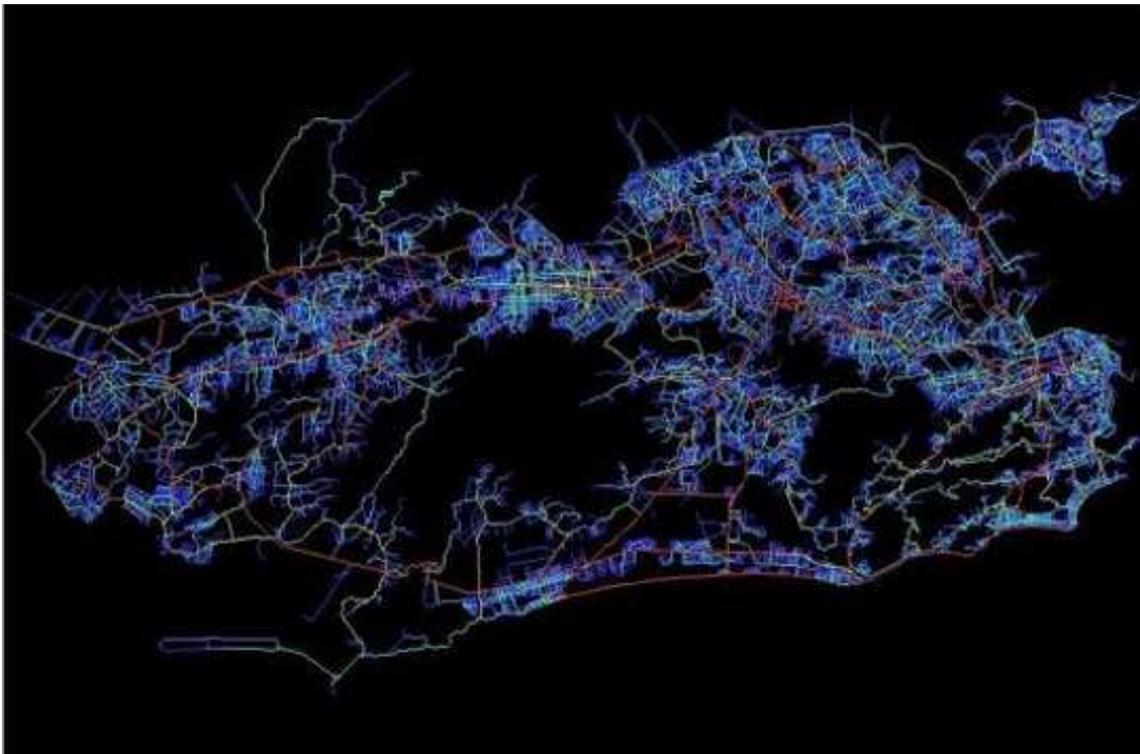
Mobility is a factor highly dependent on patterns of road and street networks. In turn, accessibility is a property of ambiguous systems both continuous and discrete at once – made of entities with strong discrete properties, streets, yet linked to others through the continuity of its open spaces. Their structure and form affect the internal distances to be covered and the directions we take when moving, in any given movement. These features also present non-trivial problems to cognition: how we get to know paths and places within a city. Therefore, internally differentiated structures of accessibility have effects over the potential to economic interaction and the reduction of transport costs and time – i.e. over production and potential transactions of goods and services (figures 6-8). These properties are mostly overlooked in economic approaches due to an overly-simplified, somewhat “elastic” and “transparent” conception of urbanized space that seems to pervade the economic imagination.



One of the cities with the most complex road network in Brazil, Salvador is an example of how our urban structures became a problem for mobility [Google Earth]



Rio de Janeiro and its complex relationship between natural geography and urban morphology [Google Earth]



The topological accessibility analysis shows how dependent is Rio de Janeiro's road network of very few main roads (range of colors from red to blue indicate variation of global accessibility, from high to low) [Valério Medeiros]

Differences in accessibility levels inherent to hierarchies in street networks, along with differences in densities of built architectural forms, bring embedded the potential to actualize economic actions and interactions. We may see the urbanization of space as a form of compression of socioeconomic interactions and relations – a brilliant, historically achieved means into the material reproduction of societies. In other words, potentials to interaction are latent in the very spatiality of urban patterns – more precisely, in the degrees and forms of structuration of accessibility networks, locational distribution and built form densities. The economic role of these material structures depends on its capacity to allow ongoing and future exchanges between actors.

Densification tends to have positive effects on new locations, intensifying centralities and exchange networks. Reduction of internal distances means lower dependence on vehicular transport and its potential negative externalities

The relation between spatial structure and the plethora of networks of production and exchange lies at the heart of the efficiency of cities as support for the localized economy: it is key to the productivity of people and firms – in fact, it is the urban condition of increasing returns – and in the long run, to its sustainability. The mediation of urban structures in the reproduction of economic relations could hardly be overestimated: it is the very thing that material connections are made of.

Economic actions and interactions materialize themselves through the structures of the city and its connections to other cities and regions, conditions for the economy self-organize with different degrees of efficiency – an economy produced, even in its global ties, even in the most de-materialized instances of information exchange, essentially at the scale of urban and regional connections.²⁷ Particularly the organization of actors engaged in production in particular needs the city: the relationship between the *hardware* of the city (its network of streets and built architectural spaces) and its *software* (the plethora of interactions it harbours and consists of) is essential to the performance of a localized economy.

Summing up, spatial agglomerations produced to reduce distances between economic actors end up structured in systems of cities and their intra-urban patterns of accessibility and activity location – which in turn have effects on economic exchanges and the future

locations of new actors. Indeed, location makes a substantial difference in the capacities of firms, workers and consumers, increasing their potential to activity and interaction while minimizing transportation costs and time. The point is that such material property, this key ontological condition of economic action goes spatially deeper than most realize. The mediation of urban structures of accessibility either amplifies or brings restrictions to the possibilities of economic interaction. Such mediation is particularly strong in the following sets of relationship:

(a) **Interactions between intermediary firms and sectors:** connections within networks of production depend on the city as a means to organize its intermediary exchanges which, in turn, constitute a substantial part of interactions in an urban economy. Spatial coordination between firms engaged in networks of production is a key point of performance of a localized economy: the pattern of intra-urban distribution of activities is closely related to how much they depend on specific accessibility levels in relation to their complementary, interacting actors. This is especially relevant when the organization of production is vertically disintegrated, involving networks of coordinated production: intermediary and final firms engaged in manufacturing whose close interactivity are likely to involve a larger regional and metropolitan network, as much as those engaged in the production of services and information whose close activities potentially involve a larger intra-urban interactivity). Both cases involve agglomeration economies. Efficiency in production linkages depend on structured road and street networks with high accessibility, and on densities able reduce average distances between interacting agents. (However, what forms should these structures take? I shall discuss this below).

(b) **The worker-firm relation:** urbanized structures should allow high accessibility for workers in their daily activities and lives. The relation, from either viewpoint (the worker searching job offers and the best conditions of accessibility to commute, and firms searching for potential workers), is likely to be affected in different ways by different urban patterns. This is to say that, other things being equal, firms' locational decisions, and transport costs and time imposed on workers tend to be positively influenced by less dispersed spatialities and uncomplicated street networks, along with mobility, efficiency, productivity for firms and workers alike. The capacity of an urbanized structure in distributing locational and mobility benefits to socially differentiated actors, a key item of social equity, cannot be stressed enough.²⁸

c) **The relation of final suppliers to final consumers** is immersed in a well-known property of mutual attraction,²⁹ which finds in the city its material projection. The city as the “locus of final consumption” can actually have a role in stimulating the economy of a whole region or country:³⁰ retail and services compete for good locations, as these relate to proximity to their potential consumers and vice-versa. Shorter distances naturally found in less dispersed cities and non-labyrinthine street networks tend to have positive impacts over the mobility of consumers – another essential item to the completion of multiple, simultaneous economic cycles. Furthermore, variety and scale are forces of attraction. Structured networks and dense urban activity systems generate conditions for fluid movement and interaction especially in large markets.

Sustainability implies the relation of a system of socioeconomic actions and groups to its spatial structure and their externalities over one another and the natural environment. The growth of a local economy depends on the completion of economic cycles of production, and the mobility of people, artefacts and information within those cycles. All these simultaneous, partially crisscrossed processes are profoundly dependent on spatial conditions

Urban diseconomies: when the city brings negative effects on economic life

A look into spatial interdependencies as a path to economic analysis leads us to a fact: space matters more than we think. The shape of urban structures (built architectural form and the street network) allows higher proximity, mobility, and connectivity among actors – or bring an entire urban system to the point of diseconomy. Urban diseconomies are the reverse of economic advantages generated by the agglomeration of actors and activities and the compression of their interactions in space: agglomeration starts to be a problem.

Diseconomies may be reached through difficulties in sharing markets of workers or consumers, and difficulties imposed by long distances and lower mobility on economic exchange – two things found easily in poorly structured spaces. It is like having too many interactions emerging without proper channels and locational systems able to keep them fluid enough. Interactions should emerge as unpredictable as they can, and in numbers and levels and in virtually any direction they need to. That is what a micro-economy is about: complexity at its highest, as intensity, elusiveness and unpredictability in

interactions and their spatial paths come into being and fade away all the time. An urban structure must be robust and resilient enough to allow changing directions in vast numbers of flows of movement and exchange. Paradoxically, that is achieved through simple means: a grid of continuous streets, allowing movement in multiple directions – in any direction, with channels connecting built forms and activities effectively enough to allow their communication.³¹

Such basic principles of continuity and connectivity in urban grids are a major problem in certain spatial cultures. Brazilian cities have strong features of quasi-labyrinthine street systems. Such systems offer low accessibility and poor levels of mobility, distributivity and reachability. Planning and realizing improvements to the urban structure are slow, inefficient and unnecessarily expensive. High costs mean less money for other public projects. Interventions also lack strategic sense, and ignore the principle that urban components and features actually operate in relation to one another and influence the workings of one another. Of course, all this brings negative impacts over the economic life of citizens and firms. These effects cut across urban scales, but are most visible in large urban centres, already immersed in diseconomy and approaching thresholds in the form of in extensive gridlocks.

A recent study³² estimated urban diseconomies in São Paulo, the main production site in Brazil, and defined means to calculate opportunity costs (people's time spent in traffic jams when commuting, average values for one hour of work) and pecuniary costs (increases in fuel consumption, costs in transportation, and costs felt by its urban population – including health issues due to emissions). There are more automobiles in the streets (an increase of 30% between 2003 and 2008), a reduction of average speed in traffic, and decreasing mobility. Not surprisingly, urban costs are growing: around U\$ 16 billion (work hours spent in commuting) plus U\$ 4 billion as diseconomies generated by increases in fuel consumption, transportation costs and negative externalities of higher pollution levels – about 10% of the city's Gross Domestic Product in 2008.

However, costs related to working time lost in slower traffic may be compensated by workers themselves, unlikely to work less than they would with adequate mobility. Such costs have stronger effects on their personal lives and time spent with families, leisure and rest, along with potential losses in their own productivity.

the Chinese dependence on urbanization is possibly greater than any other country's

Nevertheless, a second problem involves potentially higher losses: costs of production and diminishing returns. The organization of production in globally connected local economies is increasingly vertically disintegrated, and tends to depend on a large number of agents engaged in cooperated production. Productivity is a local phenomenon highly subject to delays and asynchronies in tight inter-firm networks. Therefore, a more appropriate methodology for estimating diseconomies generated by dispersed and intricate spatial patterns (both imply increasing distances) should include losses in intermediary exchanges, which slow down production and the completion of economic cycles in final consumption.

A strongly tied economy based on just in time exchanges (low stocks as a way to deal with market fluctuations) loses efficiency and wastes capacity with frictions imposed by inefficient urban structures. Inefficiency here means low density, growing sprawl (as rural and natural land is progressively converted to urban land), street networks frequently too intricate to offer short, alternative paths, with dominance of disrupted, broken, discontinuous paths, and unnecessarily longer distances and lower mobility – a problem barely accounted for in most theoretical approaches and political spheres.

Urge for solutions: contemporary issues faced by cities

Few concepts are as blurred and mistreated as “sustainability.”³³ I would like to propose a synthetic notion of sustainability as “the continuity of a system which takes into account the continuity of related systems”. Sustainability implies the relation of a system of socioeconomic actions and groups to its spatial structure and their externalities over one another and the natural environment. The growth of a local economy depends on the completion of cycles of production, and the mobility of people, artefacts and information within those cycles. All these simultaneous, partially crisscrossed processes are profoundly dependent on spatial conditions.

Seen through the prism of material conditions, the role of proximity latent in patterns of built form and street networks that constitute the city could hardly ignore be ignored. This first conclusion leads us to a second: the need to prepare structures of agglomeration and linkages. It is the case even as we approach a third urgency: the situation of structural

exhaustion faced by many cities and metropolitan areas around the world, with severe implications over urban life, work and production. Acknowledging that cities are substantially self-organizing systems resulting from an intriguing relation of things of completely different material nature – the “software” of actions and interactions and the “hardware” of urban structures³⁴ – there is a string of items which preparing cities for growing economies should consider:

⊕ **Urban policies geared to fix urban infrastructure and structure**, focused on preparing material networks to support an economic growth that will demand more and more from them – in case current forecasts of growth are right.

Conceptions of the city as linear systems of causation tending to equilibrium had limited capacity to shed light on the structure of urbanized space as an active feature in socioeconomic processes. Such processes are now acknowledged as complex and profoundly relational – cut across by contingencies, non-linearities and unpredictability.³⁵ Modes of planning unable to deal with such complexities have more risks of failing – risks already high due to complexity and contingency in the relation between intervention and its impact, cause and its effect. We are more cognitively and technologically equipped to reduce uncertainties now, but we still have a lot of work in bringing the theoretical sphere closer to the technical and political spheres of planning.

⊕ **Accessibility as a cross-scalar system**, from intra-urban to regional networks of cities and settlements: fixing accessibility means increasing the number of connections in street networks, eventually extending otherwise interrupted roads and disrupted patterns. Maximizing permeability and connectivity through precise local interventions in the street network may generate alternative paths within the city or region, increasing fluidity between different urban areas and the robustness and resilience of the network.

Reconnection should focus especially on the mezzo scale, with strong potential to increase distribution between contiguous areas and diminish dependence on the core of major streets or roads burdened with the role of giving global structuration to the urban system. Multiple paths in more internally continuous roads and integrated systems are more important than increasing the width of selected roads, as these are likely to absorb more traffic and face new exhaustion, as the whole system depends mostly on them in its overall workings. The same principles apply to metropolitan and regional road networks.

Planning in Brazil still seems to rely on the idea that any sort of investment in infrastructure would be effective anyway

Urban analysis for economic efficiency should include the identification of key points of reconnection and extension, fixing micro-disruptions and discontinuities between contiguous areas. Selection of intervention points must take into account the simulation of different scenarios and potential gains in accessibility through precise computational models, taking into account costs of actual intervention. Expanding the core of global accessibility in a city or region also means reinforcing the distribution of economic activities such as retail and services, with potentially beneficial effects over final demand, reducing distances and travel time in consumer behaviour, and dependence on private cars.

✪ Approaching **urban form and performance** through appropriate methodologies brings to light potential gains generated by the intensification of economic interaction in urban centralities, along with heightened levels of liveability and productivity. The intertwine of space and our urban experiences is such that one could hardly overestimate how much damage spatial friction can impose on the delicate fabric of social practices, and how much urban space may support them as their real backbone. We have a better picture of such interrelations now, but we are still far from a complete description of the condition of urban experience: a description able to grasp the liveliness of the relation between societies, socioeconomic practices and their spatial conditions.

✪ **The mobility of workers:** a problem faced especially by developing countries as they struggle to prepare their cities through top-down infrastructure policies in a way to cope with fast, bottom-up economic growth, is the lack of mass transport systems and, a step further, interconnected transport systems (say, bus lines articulated with underground stations and so on). In these countries it is not unusual to spend hours in commuting. That is not acceptable. Such waste of time, energy and resources affects directly the daily lives, socialization, and productivity of workers. Optimizing proximity and mobility tends to have the humanization of conditions of live, stimulating the capacities and creativities of people, as positive externalities.

✪ **Control of urban expansion over rural areas and natural geographies,** through policies of consolidation of efficient locational patterns and centralities have potential positive externalities such as propelling intensity and diversity in socioeconomic activities

and exchanges. Despite the never-ending debate on urban form and sustainability and the incompleteness of research methods and results on urban performance, enough evidence point to the urgency of the problem. Especially in fast urbanizing countries, densification must be achieved through urban policies on compact buildings and the urbanization of empty or barely occupied intra-urban land with residential use and new industries. Densification tends to have positive effects on new locations, intensifying centralities and exchange networks. Reduction of internal distances means lower dependence on vehicular transport and its potential negative externalities.

✦ **Communication and transport technologies** constitute shortcuts in the material fabric of social life. Electronic spaces and mobile communication tie us more and more strongly to concrete spaces (instead of replacing them, as feared by many).³⁶ Transport technologies also involve converging different systems as solutions for the problem of mobility, especially in growing metropolitan areas. In developing countries, there are considerable difficulties in covering large low-density areas with mass transport systems, which may be overcome if different modes of transport converge – say, relating private vehicles used to cover low-density areas to parking areas around bus and underground stations, with the role of supporting commuting.

✦ **Generation of new urban and regional nodalities** along strings of urbanized development, free from diseconomies of metropolitan areas, yet connected to them.

More broadly, concerns with the economic performance of cities must relate to predictions of substantial occupational shifts from rural and industrial sectors (and their spaces) into producer services, financial and informational industries – and their specific locational requirements more dependent on face-to-face communication. Such industries tend to be anchored in geographical concentration.³⁷ Appropriate forms of urbanization imply strategies for absorbing such shifts into an urbanized labour market in adequate job and residential locations. The sparks to economic development still relate to a form of urbanization based on the intensification of activities dependent on proximity and the completion of economic cycles. Capacities of production depend on the city: increasing exchanges in higher frequencies among higher numbers of growingly diversified actors require intensified patterns of agglomeration and location. Built form production and urban grids of higher accessibility are spatial responses to such complexity, i.e. a translation of increasing complexity in the socioeconomic software into simple spatial solutions:

architectural densities as the compression of interactions and relations, and internally continuous, robust grids with improved capacities to generate alternative paths and absorb increasing movement.

The option of ignoring the need to prepare cities for growth means that economies, in their localized materialization, might eventually suffocate in their own limited spatial linkages and structures, and lack the sparks for intensifying their elusive exchanges. Whenever rarefied urban patterns and grids of poor accessibility weaken the deep relation between socioeconomic dynamics and their spaces, cities will get in the way instead of fostering our economies.

ABOUT THE AUTHOR

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¹ Many of these observations on China were suggested by Romulo Krafta. The usual disclaimers apply.

² Yang, Yao (China Center for Economic Research) China Daily, 16th December 2009.

³ *Le Monde*, 22nd December 2009.

⁴ According to Thom Phillips, "Lula era comes to an end in Brazil", *The Guardian*, 31st December 2010 <http://www.guardian.co.uk/world/2010/dec/31/brazil-lula-era-ends?INTCMP=SRCH>

⁵ An important exception in the Brazilian scenario is the regional model of high-tech industrial production in the state of São Paulo – one based on a network of small and medium-sized cities, strongly spatially linked through world-class infrastructure. Such regional system, the role of the massive metropolitan area of São Paulo was redefined, since inland conditions for less dependence on the material infrastructure of the main city in the region were created. I thank Romulo Krafta for such information.

⁶ "The degree of concentration of economic activity is striking. Roughly 75% of Americans live in cities as defined by the Census Department, and yet cities occupy only 2% of the land area of the lower 48 states. A similar story could be told for any other developed county: labor and capital are both heavily concentrated in cities." Rosenthal, S. and Strange, W. "Evidence on the nature and sources of agglomeration economies." In Henderson, J.V. and Thisse J.-F. (2004) (org). *Handbook of Urban and Regional Economics*. New York : North Holland, n. 4, p. 2119-2171.

⁷ See Edward Glaeser's: "Reinvention requires a new wave of innovation and entrepreneurship, which can emerge from our dense metropolitan areas and their skilled residents. America must stop treating its cities as ugly stepchildren, and should instead cherish them as the engines that power our economy. America's 12 largest metropolitan areas collectively produced 37 percent of the country's output in 2008, the last year with available data [...] For decades, the American dream has meant white picket fences and endless suburbs. But the ideas created in dense metropolitan areas power American productivity. We should reduce the pro-homeownership bias of housing policies, such as the home mortgage interest deduction, which subsidize suburban sprawl and penalize cities. We should rethink infrastructure policies that encourage Americans to move to lower-density environments" ("America's Revival Begins in its Cities," 30th December 2010) – in <http://www.hks.harvard.edu/news-events/news/>. These ideas are based on a firmly established tradition, having as a highlight Jane Jacobs' works (*The Economy of Cities*. New York :Vintage, 1969); see also Storper, M. and Salais, R. (1997) *Worlds of Production: Action Frameworks of the Economy*. Cambridge (MA) : Harvard University Press.

⁸ Friedman, T. (2005) *The World Is Flat: A Brief History of the Twenty-first Century*. New York: Farrar, Straus and Giroux; O'Brien, R. (1992) *Global financial integration: the end of geography*. London: Royal Institute of International Affairs. Cairncross, F. (1997) *The Death of Distance*. Cambridge, Ma: Harvard Business School Press. Castells, M. (1996) *The Rise of the Network Society*. London, Blackwell. Quah, D. (1999) *The Weightless Economy in*

Economic Development. Wider Working Paper 155. See Rodríguez-Pose, A. and Crescenzi, R. (2008) "Mountains in a flat world: why proximity still matters for the location of economic activity." *Cambridge journal of regions, economy and society*, 1 (3). pp. 371-388.

⁹ Rodríguez-Pose and Crescenzi (2008).

¹⁰ Examples under the assumptions of constant returns and perfect competition are the central business district in the monocentric-city model of urban economics or the different endowments of production factors in international trade. See Fujita, M. and Thisse, J.-F. (2009) "New Economic Geography: an appraisal on the occasion of Paul Krugman's 2008 Nobel Prize." *Regional Science and Urban Economics*, n. 39, p.109-119.

¹¹ Spill-over consists of unforeseen gains and connections engendered by effects of economic actions. See Audretsch, D. B. and Feldman, M. P. (2004) "Knowledge Spillovers and the Geography of Innovation" in Henderson and Thisse J.F. (2004); Rosenthal and Strange (2004).

¹² In order to save transportation costs, firms in transaction tend to locate nearby to each other. This is a traditional Weber's location decision problem [Weber, A. (1909), *Theory of the Location of Industries*, Chicago, IL, University of Chicago Press] – see Nakamura, R. (2008) "Changes in Agglomeration Economies and Linkage Externalities for Japanese Urban Manufacturing Industries:1990 and 2000." RIETI Discussion paper.

¹³ Rigby, D. and Essletzbichler, J. (2002) "Agglomeration economies and productivity difference in U.S. cities." *Journal of Economic Geography*, n. 2, p. 407-432.

¹⁴ Fujita, M. and Krugman, P. (1995) "When is the economy monocentric? Von Thünen and Chamberlin unified." *Regional Science and Urban Economics*, n. 25, p. 505-528; Henderson, J. V. (1988) *Urban Development. Theory, Fact and Illusion*. Oxford: University Press – respectively.

¹⁵ Glaeser et al define localization economies as Marshall-Arrow-Romer externalities [Glaeser, E.L, H.D. Kallal, J.A. Scheinkman, and A. Shleifer (1992), 'Growth in cities,' *Journal of Political Economy*, 100, 1126-1152].

¹⁶ Rigby and Essletzbichler estimate externalities of input-output linkages over the productivity through Input-Output Tables, finding positive effects in both in localization economies and Jacobs' urbanization economies – Rigby, D. and Essletzbichler, J. (2002) "Agglomeration economies and productivity difference in U.S. cities." *Journal of Economic Geography*, n. 2, p. 407-432. Glaeser et al. (1993), Henderson et al. (1995), and Rosenthal and Strange find contributions of Jacob's externalities to urban growth [Henderson, J.V., Kuncoro, A., and Turner, M. (1995), "Industrial development in cities," *Journal of Political Economy*, 103, 1067-1090; Rosenthal, S.S. and W.C. Strange (2003), 'Geography, industrial organization, and agglomeration,' *Review of Economics and Statistics*, 85, 377-393]. However, Nakamura and Henderson show that localization economies are stronger factors than urbanization economies in manufacturing productivity, with considerable variations among industries – see Nakamura (2008). Finally, both Marshall and Jacobs refer to the value of urban diversity, in which complementarities in job offers may reduce risks generated by fluctuations in the economy (Rosenthal and Strange, 2004).

¹⁷ Rosenthal and Strange (2004).

¹⁸ Knowledge spillovers in Europe were estimated to have effects within a 200km distance from major cities; in the USA, spillovers rarely GO beyond metropolitan areas. See Rodríguez-Pose and Crescenzi (2008); Jaffe, A.; Trajtenberg, M. and Henderson, R. (1993) "Geographic localization of knowledge spillovers as evidenced by patent citations." *Quarterly Journal of Economics*, 108(3): 577-98; and Howells, J. (2002) "Tacit knowledge, innovation and economic geography." *Urban Studies* 39 (5-6), 871-884.

¹⁹ Storper, M.; Venables, A. J. (2004) "Buzz: face-to-face contact and the urban economy." *Journal of Economic Geography*, 4: 351-70.

²⁰ Fujita and Thisse (2009:111-112).

²¹ Krugman, P. (1991) "Increasing returns and economic geography." *Journal of Political Economy*, n. 99, p. 483-499.

²² Fujita and Thisse (2009:113).

²³ Fujita and Thisse (2009:113). On the other hand, differences in market sizes and regions may stimulate exports from smaller regions to those larger markets, counterbalancing differences. This may be the case from relations between cities and regions to the world economy.

²⁴ Fujita and Thisse (2009:111).

²⁵ There is a growing literature on spatial cognition stemming from geographic and urban studies – see Montello D R, Freundschuh S.M. (2006) "Cognition of geographic information", in *A Research Agenda for Geographic Information Science* Eds R B McMaster, E L Usery (CRC Press, Boca Raton, FL) pp 61- 91.

²⁶ See Hillier, B., Penn, A., Hanson, J., Grajewski, T. & Xu, J. (1993) "Natural Movement - or, Configuration and Attraction in Urban Pedestrian Movement", *Environment and Planning B - Planning and Design*, 20 (1), 29-66. Barabási, A.-L. & Albert, R. (1999) "Emergence of Scaling in Random Networks", *Science*, 286 (5439), 509-512. Figueiredo, L. & Amorim, L. (2007) "Decoding the urban grid: or why cities are neither trees nor perfect grids", in Kubat, A. S., Ertekin, Ö., Güneş, Y. I. & Eyüboğlu, E. (Eds.) *Proceedings of the 6th International Space Syntax Symposium*. Istanbul Technical University, Faculty of Architecture, Istanbul. Batty, M. (2009) "Editorial: Accessibility: in search of a unified theory" *Environment and Planning B: Planning and Design* vol. 36, pp 191-194; and growing literature on properties of cities as movement systems and street networks.

²⁷ Sassen, S. (2001) *The Global City* 2nd edition. Princeton: University Press.

²⁸ Harvey, D. (1973) *Social Justice and the City*. Baltimore, John Hopkins University Press.

²⁹ Krafta, R. (1997) *Urban convergence: morphology and attraction*, In Timmermans, H. (org). *Decision Support Systems in Urban Planning*. London, E&FN Spon.

³⁰ It comes to mind the case of Buenos Aires, a global touristic destination in the late 1990s and 2000s. This condition probably had to do with Argentina's overcoming a strong economic crisis in the 1990s.

³¹ Netto, V. (2008) "Practice, space and the duality of meaning" *Environment and Planning D: Society and Space* 26, 359-379. Hillier, B. and Netto, V. (2002) "Society seen through the prism of space: outline of a theory of society and space." *Urban Design International*, v. 7, p. 181-203.

³² Fundação Getúlio Vargas (FGV) and Instituto de Pesquisa Econômica Aplicada (Ipea). Cintra, M. (2008) "O custo dos congestionamentos em São Paulo", São Paulo, FGV.

³³ See Hornsby, A. (2009) "Like rats: a paper on democracy, sustainability and the urban form" in *Cluster* – <http://www.cluster.eu/like-ratscome-topi/>

³⁴ See Netto (2008).

³⁵ Batty, M. (2005) *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*, The MIT Press, Cambridge.

³⁶ As the overestimated predictions of Mitchell, Cairncross, Castells and many others on the future of cities, the role of virtual spaces and the eventual demise of the city. Compare with Sassen's more grounded observations. See Lemos, A. (2010) "Post-mass media functions, locative media, and informational territories: new ways of thinking about territory, place, and mobility in contemporary society." *Space and Culture* 13: 403.

³⁷ See Sassen's (2001); Sedgley, N. and Elmslie B. (2011) "Do We Still Need Cities? Evidence on Rates of Innovation from Count Data Models of Metropolitan Statistical Area Patents." *American Journal of Economics and Sociology* vol.70-1, p.86-108 <http://onlinelibrary.wiley.com/doi/10.1111/j.1536-7150.2010.00764.x/abstract>